



# INDONESIA: Renewable Energy Market

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05/2006  
ID:# 136804

## SUMMARY

The recent increase in global oil prices and higher domestic demand are draining the government's budget and causing fuel shortage in several provinces in Indonesia. The Indonesian Government (GOI) acted fast however, by announcing a national plan to reduce the country's dependency on oil. The GOI aims to increase the use of new and renewable resources to produce energy from 0.2 percent currently to 4 percent by 2025. The target is certainly achievable given Indonesia's massive potential renewable energy (RE) resources. Potential supplies of geothermal, solar, wind, micro hydro and biomass energy are estimated of 160 gigawatts of electric capacity. However, the development of RE has been slow because the state-of-art technology involved of this energy is more expensive than energy produced by conventional hydrocarbon-fired plants. Commercial opportunities for U.S. companies exist in equipment and technology related to RE energy development.

## MARKET OVERVIEW

Indonesia is endowed with substantial resources of RE, but it has not been widely used. RE makes up a very small share of the country's total installed capacity of more than 25,000 MW of electricity. To accelerate the use of RE, the GOI has issued the Presidential Regulation No. 5/2006 regarding the national energy policy. In addition, the government also issued the Presidential Instructions No. 1/2006 and No. 2/2006 on provision and implementation of the bio-fuel and liquefied coal respectively.

Other policies related to Renewable Energy and Energy Efficiency:

- Green Energy Policy (Ministerial Decree No.2/2004)
- Small Power Generation using Renewable Energy (Ministerial Decree No. 1122 K/30/MEM/2002)
- Geothermal Law (Law No. 27/2003)
- Regulation on Electricity Supply and Utilization (Government Regulation No. 03/2005)

The installed capacity of power generated using RE is shown on the table below:

Indonesia's Energy Potential 2005

Fossil Fuel	Resource	Proven + Possible	Production/year
Oil	86.9 billion barrels	9 billion barrels	500 million barrels
Gas	384.7 TSCF	182 TSCF	3 TSCF
Coal	57 billion tons	19.3 billion tons	130 million tons

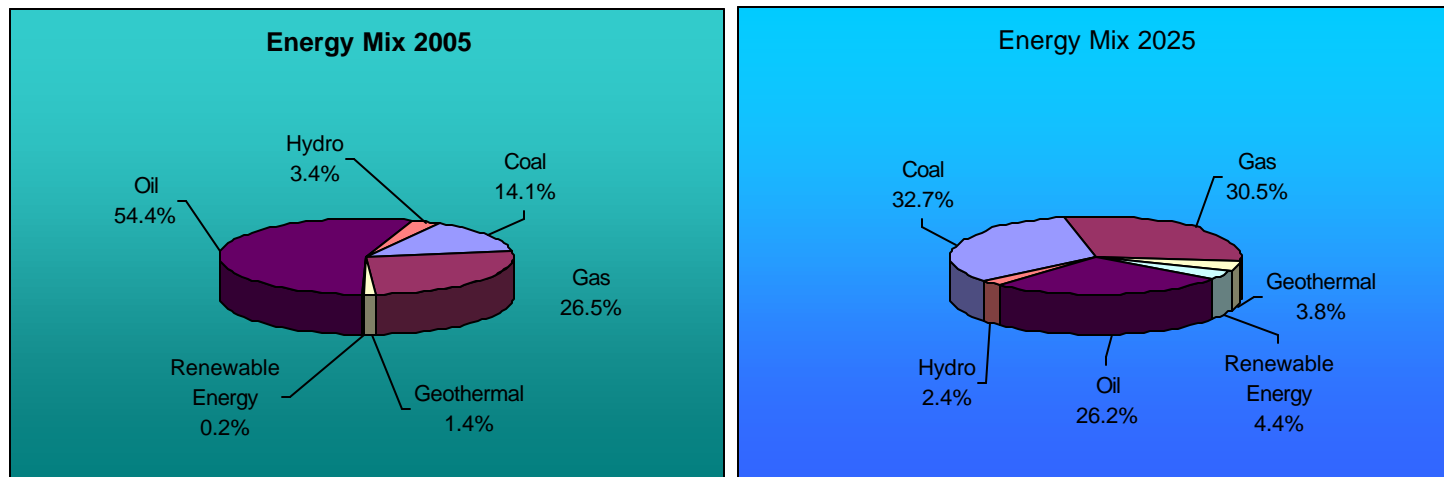
Renewable Energy	Unit	Potential	Installed capacity
Hydro	MW	75,000	4,125
Geothermal	MW	27,140	807
Tidal	MW	240,000	0
Biomass	MW	49,810	445
Solar	GW	1,200	0.008
Wind	MW	9,290	0.6

Source: Ministry of Energy and Mineral Resources, PT PLN

Note: TSCF; trillion standard cubic feet

BOE: barrel oil equivalent, GW: gigawatt

## Energy Mix 2005 and 2025



Source: Ministry of Energy and Mineral Resources, 2005

## MARKET TREND AND OPPORTUNITIES

In the Blue Print National Energy Implementation Program 2005-2025, the GOI targeted that RE contribute 4% of the country's electricity demand by 2025. The use of RE in 2025 is targeted as follows:

- Geothermal: 9,500 MW
- Micro Hydro: 500 MW (on grid) and 330 MW (off grid)
- Solar Energy: 80 MW
- Biomass: 810 MW
- Wind Energy: 250 MW (on grid) and 5 MW (off grid)
- Bio-diesel: 4.7 million kiloliter
- Gasohol: 5% of gasoline consumption

## GEO THERMAL

Indonesia, located in the "ring of fire" volcano belt, is estimated to hold about 40 percent of the world's geothermal reserves, equivalent to a total of 27,140 megawatts (MW) of power. While the country has several operational geothermal power plants, their combined capacity currently is only 807 MW or about 3 percent of the country's total geothermal potential. The development of the use of geothermal resources is hampered by several factors such as high investment costs, limited incentives and lack of technology. The Geothermal law issued in 2003 (Law No. 27/2003) is expected to provide a conducive atmosphere to geothermal development in Indonesia.

Currently there are 33 Geothermal Working Areas that has been issued, which 15 of them owned by the state-owned oil and gas company, PT Pertamina. In addition, the GOI offers 28 open geothermal working areas, which bring a total potential of 13,497 MW. This energy potential is expected to fulfill the geothermal development target to generate electricity of 6,000 MW in 2020 and 9,000 MW in 2025.

PT PLN, the state-owned electricity company, will build an additional 16 geothermal power plants with a total capacity of 1,150 MW. Up until the first quarter of 2005, the installed capacity of PLN's Bali-Java system was 19,514 MW with around 4% generated from geothermal power plants. Outside Java-Bali, from 5,573 MW installed capacity, only 20 MW is generated from geothermal plants. The existing geothermal power plants in operation are: Darajat (150 MW), Dieng (60 MW), Kamojang (140 MW), Gunung Salak (330 MW), Sibayak (20 MW), Lahendong (20 MW) and Wayang Windu (110 MW) among others.

Several on-going geothermal projects:

- PT Star Energy, after taking over from Unocal in 2004, continues to develop the Wayang Windu Geothermal Power Plant with the capacity of 110 MW. The company had reached a purchase power agreement with PT PLN for \$0.049 per kWh. It is expected that the power plant will operate in 2008.
- Sumitomo Corp with PT Rekayasa Industri will build the Lahendong II Geothermal Power Plant in North Sulawesi (20 MW). Sumitomo won the contract to build the \$28.5 million power plant and it is expected that the power plant will operate in 2007.
- PT Geo Dipa Energi, which is jointly owned by PT Pertamina and PT PLN, will build a \$250 million Sarulla geothermal power project in North Sumatra. The project is expected to start in August 2006 and is scheduled to be operational in 2009.

Other opportunities in Geothermal Business Development:

- Lumut Balai, South Sumatera, 2 x 55 MW, steam field development
- Ulubelu, Lampung, 2 x 55 MW, steam field development
- Tuhelu, Maluku, 2 x 2.5 MW, steam field development
- Patuha, West Java, 3 x 60 MW, power plant development
- Kamojang, West Java, 60 MW, power plant expansion
- Dieng, Central Java, 2 x 60 MW, power plant expansion
- Tompaso, North Sulawesi, 2 x 20 MW, steam field development
- Pangalombian, North Sulawesi, 20 MW, power plant development

## HYDRO POWER

Hydropower resources for electricity power generation are still under-utilized. The total estimated hydropower energy potential is about 75,000 MW including microhydro energy at 500 MW. Total installed capacity is 2,700 MW of which 2,500 MW is owned by PT PLN. Besides PT PLN, PT Inco, the state-owned nickel company, is building the Balambano hydropower plant in Soroako, Sulawesi.

More than 200 units of micro hydro with a capacity between 50 kW and 500 kW are installed around the country. Most of the existing micro hydropower plants are installed off-grid as they are used in rural and remote areas. Currently, PT PLN has 12 ongoing projects in Papua, Nusa Tenggara, Sulawesi and Kalimantan. The projects are financed by ADB and are expected to be in operation by 2006-2007. PT PLN plans to develop 8 hydro power plants during 2008-2010 in Sulawesi, Jambi, West Java and East Nusa Tenggara.

## SOLAR ENERGY

The potential of solar energy in Indonesia is relatively good with a daily average intensity between 4.8 to 5.1 kWh/m<sup>2</sup>/day. Common technologies that have been used are solar thermal and photovoltaic. Photovoltaic solar energy is used in rural areas to generate electricity, while solar thermal energy is used for solar stove, water pumping, drying equipment for agricultural product, water heaters and telecommunications. The current installed capacity is only 8 MW because of high investment and operational cost.

The government plans to build 15,000 solar power plants in Eastern Indonesia, each unit with a capacity of 100 watts. The cost for each unit ranges from \$500 - \$600 and will be financed from the state and PLN's budgets.

## BIOMASS

Indonesia has a large potential of biomass energy, which is estimated equivalent to 50,000 MW. The current installed capacity is around 445 MW mostly in rural areas. The traditional utilization of biomass is through direct burning and later on through modern conversion technology such as pyrolysis and gasification.

Most biomass energy is used for household, for rice milling, drying of agriculture produce, and power generation in the wood and sugar industries.

The biomass potential consists of 15.45 million m<sup>3</sup> of forest residues per year, 64 million tons of plantation residues per year, 144.5 tons agriculture per year and 11,330 tons municipal waste per day. According PT PLN, several private companies plan to build biomass power plants using palm oil waste in North Sumatra and Riau, rice husk in Lampung and Bali, and bagasse in Lampung.

According to Perhapi (Mining Experts Association), 12 big cities in Indonesia have the potential to produce 566 MW from municipal waste. Jakarta's provincial government has picked five private companies to build garbage/waste treatment plants in Jakarta. In the meantime, the GOI is proposing a draft of a Waste Processing Law, which will open business opportunities in waste and recycling management to private companies.

## WIND ENERGY

The potential of wind energy is relatively small with the wind speed between 3 and 5 m/second. The current limited utilization of wind energy (around 0.5 MW) concentrates on stand-alone electricity production in rural and remote areas and it is used for rural electricity, water pumping and battery charging. The local industry is able to build wind energy conversation systems up to 5 kW of capacity.

PT PLN currently is developing 3 wind power plant projects in Bali (3 x 250 kW), West Nusa Tenggara (3 x 250 kW) and East Nusa Tenggara (6 x 250 kW). It is expected that these power plants will be in operation in the 2006/2007 time frame.

## BIODIESEL

Biofuel could be produced from various raw materials, including Crude Palm Oil (CPO), sugar and cassava. CPO can be used to produce biodiesel, a replacement for diesel, while sugar and cassava can be used to produce bioethanol to replace gasoline. Besides biodiesel and bioethanol, the government would also promote the production of biooil made of vegetable oil and biogas, which can be used to replace gasoline.

A few years back, biodiesel had very limited recognition in Indonesia as an alternative source of energy. However, conditions are different now. The increase in mineral oil prices and the subsequent reduction of the fuel subsidy have considerably improved the feasibility of biodiesel in Indonesia. The Blueprint for National Energy Management targeted the use of biodiesel at 4.7 million kiloliters by 2025. Currently, the retail sales of biodiesel in Indonesia are estimated at 1 ton per day.

In promoting the production of biofuel, the government already had a number of legal instruments, including the Presidential Regulation No. 5/2006 on national policies for optimizing energy use and the Presidential Instruction No. 1/2006 on the use of biofuel. The GOI promised to simplify the license process and reduce import tax for equipment used to produce biofuel in Indonesia. With the addition of the proposed incentives, Indonesia has the potential to produce 720,000 kilolitres of biofuel per year between 2005 and 2010. It will increase to 1.5 million kilolitres per year during 2010-2015 and 4.7 million during 2015-2025. In order to reach the production of 720,000 kiloliters, it will require developing 8 biodiesel plants with capacity of 100,000 kiloliters per year or 27 plants with capacity of 30,000 kiloliters per year.

In 2005, the country issued licenses to produce biofuel and bioethanol to 11 companies with the capacity 50,000 – 150,000 kilolitres per year. PT Bakrie Sumatra Plantations and PT Rekayasa Industri will develop the first biodiesel plant in Indonesia. The plant, with the capacity of 60,000 – 100,000 tones of biodiesel per year, will require a \$25 million investment. The plant is expected to be in operation by 2008. Currently, PT Eterindo Wahanatama is the biggest producer of biodiesel with the production capacity of 137 tons/day. Its subsidiary, PT Anugerahinti Gemanusa can produce 60 tons/day. For comparison, the commercial production of the biodiesel plant from BPPT (the Agency for Assessment and Application of Technology) is only 3 tons/day. To boost biodiesel production in Indonesia, Ministry of Industry has pledged Rp. 60 billion to build four biodiesel plants and is currently setting up the tender procedures.

## **GASOHOL**

Recently, the government issued a regulation that allows the use of 10 percent alcohol in the gasoline to form Gasohol E10 (DG Oil and Gas Decree no.3674K/24/DJM/2006 dated March 17, 2006). The use of gasohol to replace gasoline is targeted to reach 1.8 million kiloliters in the next 5 years. The current alcohol production capacity is only 180,000 kiloliters. Among the companies that produced alcohol are PT Rajawali Nusantara Indonesia (RNI) and PT Molindo Raya Industrial. PT RNI has 2 plants in Yogyakarta and Cirebon that produced alcohol and plans to build a new plant in 2007. Currently, Indonesia produces 1.3 million tons of molasses and around 50% is used for alcohol production.

Additional supply of alcohol will come from Lampung province. CMS Corp from South Korea has signed an MOU with the Lampung Provincial Government to develop a bioethanol manufacture plant with the capacity of 1.5 million kiloliters of ethanol per year. The plant will need around 10 million tons of cassava per year. In addition, PT Medco Energi International with PT Trada Bioenergy Indonesia plans to build a \$34.13 million ethanol plant in Kotabumi, North Lampung. The plant is designed to produce 60,000 kiloliters per year from cassava or molasses.

## **END USERS**

The electric power industry in Indonesia is solely managed by Perusahaan Listrik Negara (PLN), a state-owned monopoly. PLN has various business units that carry out functions as generation, transmission and distribution companies. In addition to the supply from its own power generation plants, PLN has additional power supply from Independent Power Producers and captive power plants. Captive power plants are power generation plants that are built, operated and used by private companies such as mining companies, oil exploration companies, pulp and paper factories and high rise building management companies.

PT Pertamina is the state-owned company responsible for exploiting oil, gas and geothermal energy. The GOI permits other agencies and private developers to undertake geothermal development on a small-scale basis (less than 10 MW) for power generation or other utilization, without a partnership with Pertamina. PT Pertamina also is the only distribution company, selling biodiesel commercially in Jakarta. Starting with 3 fuel stations, Pertamina will supply 24 kiloliters of biodiesel, a mix between 90-95 percent regular diesel and 5-10 percent of CPO. The biodiesel will be sold at Rp.4,500- 5,000 per liter. Pertamina plans to have 10 biodiesel filling stations in Jakarta by the end of 2006.

## **COMPETITION**

Many local firms can make several products such as turbine, boiler and electrical devices that can be manufactured with high local content. In the solar market, solar thermal water heaters and solar dryers are manufactured locally. While photovoltaic modules are locally assembled, solar drying equipment for agricultural products is in the fabrication stage. Small wind energy conversion system components except the generators also can be produced locally.

More sophisticated equipment such as generators, high-pressure modern boilers, turbines, and process controls is imported from the U.S., Japan, France and Germany among others. In general U.S. products are well accepted, but they are perceived as high-priced products. However, purchase decisions are dependent not only on the brand but also on cost, financial availability, technology transfer possibilities etc.

## **MARKET ACCES AND ENTRY STRATEGIES**

There are no non-tariff barriers inhibiting the importation of renewable energy equipment. Import duties have been progressively reduced over the years in a number of deregulation measures by the government. Since the government attaches great importance to the development of the electricity sector, imports of related equipment are as much as possible facilitated, to provide the necessary incentives to the private sector. With regard to

technical and safety standards, Indonesia has adopted international norms and there are some guidelines for technical specifications of energy equipment.

Foreign suppliers who want to supply RE equipment are encouraged to appoint a local representative or agent mainly to look after their interests in the Indonesian market. Most RE projects are managed by the state-owned electricity company, PT PLN. For geothermal projects, a company should work with PT Pertamina, the state-owned company responsible for exploiting oil, gas and geothermal energy. Only registered Indonesian companies can bid on most service contracts to PT PLN and PT Pertamina. Most purchases of goods and services are done through tenders. Generally only vendors with a registered vendor ID (Tanda Daftar Rekanan -- TDR) are considered qualified contractors (Daftar Rekanan Mampu - DRM) and permitted to bid. Sometimes, however, direct purchasing is permitted without competitive bidding. Tender awards by PT PLN and PT Pertamina are based on price, Indonesian content, technical advantage, and reputation. Domestic goods and services must be used, if available, even at higher cost.

To learn about activities and trade opportunities in energy industry, there are several websites that can be accessed after paying a membership fee:

1. [www.tender-indonesia.com](http://www.tender-indonesia.com)
2. [www.iogonline.com](http://www.iogonline.com)
3. [www.petromindo.com](http://www.petromindo.com)

## TRADE EVENTS

Renewable Indonesia 2007, [www.pamerindo.com](http://www.pamerindo.com)

The 4th International Exhibition for Renewable Energy Technologies to be held: 31 Oct - 3 Nov 2007 at the Jakarta International Exhibition Centre, Kemayoran.

## RESOURCES & KEY CONTACTS

Ministry of Energy and Mineral Resources, website: [www.esdm.go.id](http://www.esdm.go.id)

Directorate General of Electricity, website: <http://www.djpe.esdm.go.id/>

PT PLN, website: [www.pln.co.id](http://www.pln.co.id)

PT Pertamina, website: [www.pertamina.com](http://www.pertamina.com)

## FOR MORE INFORMATION

The U.S. Commercial Service in Jakarta, Indonesia can be contacted via e-mail at: [Anasia.Silviati@mail.doc.gov](mailto:Anasia.Silviati@mail.doc.gov); Phone: (62-21) 526-2850; Fax: (62-21) 526-2855 or visit our website: [www.buyusa.gov/indonesia](http://www.buyusa.gov/indonesia)

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